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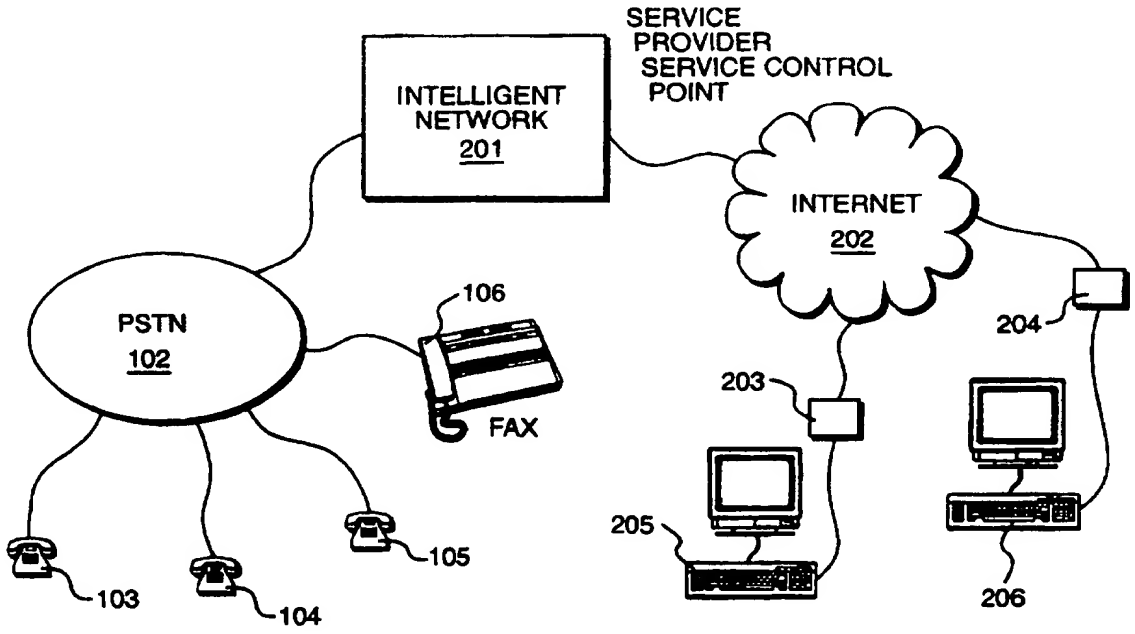

(57) Abstract

Communication to a configuring device (201) for configuring a telecommunications network (102) is provided via a second network (202), such as the Internet. Instructions for presenting a user interface at a user terminal (205) are generated by the second network such that when these instructions are executed by a user terminal, a user is invited to supply configuration data. The second network then relays this configuration data to the configuring device.

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ACCESSING TELECOMMUNICATIONS SERVICES

Introduction

The present invention relates to providing user access to control apparatus for a telecommunications network such that users may configure aspects of said network.

The basic provision by telecommunications companies of networks for making phone-to-phone voice calls has been augmented in recent years by the provision of many additional services. Examples of these services include automated telephone answering and message storage, voice call diversion and fax call diversion. Typically these services reduce the need for customers to buy expensive equipment in their own home or office, such as telephone answering machines by providing highly sophisticated services to a large number of subscribers from a centralized computer site.

The widespread use of mobile phones has considerably increased the demand for augmented services and a new market has been identified, in response to competition from mobile phones, involving the automatic transfer of calls. In accordance with this service, calls may be made to a person in preference to a location. Such a service involves allocating telephone numbers to people instead of to telephone lines and this service is sometimes referred to as personal number dialling. Thus, with appropriate programming, it is possible for telephone calls to be directed to customers as they move from one location to another without requiring that customer to carry mobile telephoning equipment.

Theoretically, the variety of services that may be provided over public switched networks is considerable. However, the ability to provide and operate these services is restricted by the simplicity of the standard telephone, with its limited user interface. Thus, when it is desired to provide a particular customer with an extremely comprehensive array of services,

the simple numerical keypad on a telephone makes access to these services tedious, complex and error-prone.

A solution to this problem is to provide a more comprehensive user interface using a personal computer equipped with appropriate communications hardware and software, in order to improve access to enhanced telecommunications services.

Systems are known in which customers may have telephones and fax machines connected to a public switched network. The network may include intelligent service notes allowing service providers with the ability to store in-coming voice and fax messages, forward telephone calls to different numbers at various times of the day and provide other sophisticated telecommunications services.

A customer may call a number and a database, operated by the service provider, may store records of the times of day during which the owner of the telephone is unavailable, for example at lunch times. Consequently, at particular times of the day, calls to the number are diverted by the service provider to an internal message recording facility. The service provider prompts the caller to leave a message which will then be stored, usually on magnetic media such as a hard disk array, in compressed form, for later play-back.

A problem with known systems of this type is that conventional telecommunications equipment does not facilitate the transmission of sophisticated data requests, therefore it is difficult for customers to relay information to intelligent service notes so as to configure them in the way required by the customer. Consequently, in many situations, the technical possibilities available within the network are not fully exploited.

Summary Of The Invention

According to a first aspect of the present invention, there is provided apparatus for communicating with a configuring device for configuring a telecommunications network, comprising: a second network including input means and output means; and a user terminal connected to said

configuring device by a said second network; wherein said output means is arranged to generate instructions for presenting a user interface; and said input means is arranged to receive configuration data from said terminal and to supply configuration commands to said configuring device.

In a preferred embodiment, a telecommunications network is a switched telephone network arranged to receive voice signals and modulated data signals. A network may include means for forwarding incoming calls to selected destinations and may include means for storing incoming voice calls. Said modulated data calls may be facsimile transmissions and means may be provided for storing said facsimile transmissions.

In a preferred embodiment, the second network is the Internet and output instructions and input instructions are supplied over said Internet in accordance with the hypertext transport protocol.

According to a second aspect of the present invention, there is provided a method of providing user access to configuring apparatus arranged to control aspects of a telecommunications network, such that users may configure aspects of said telecommunications network independently of a network provider, comprising steps of: providing a second communications channel between a user and said control apparatus via a second network, said second network having a user terminal and an interconnection means for connecting said second network to said control means, wherein a user interface is presented to a user at said user terminal in response to user interface commands supplied to said user terminal from said interconnection means via said second network, such that said interface commands invited user to modify said telecommunications network and in response to modification instructions generated at said user terminal, control instructions are sent to said control means via said second network and said interconnection means.

In a preferred embodiment, communications received by said telecommunications network are stored by said first network and so communications are relayed to said user by a said second network. In a

preferred embodiment, the second network is the Internet and instructions are supplied over said Internet in accordance with the hypertext transport protocol.

Brief Description of the Drawings

Figure 1 shows a known arrangement for providing computer access to telecommunications services provided PSTN;

Figure 2 shows an improved arrangement for providing computer access to telecommunications services provided over the public switched telephone network, including an intelligent network and a remote terminal;

Figure 3 details the intelligent network shown in Figure 2, including a master processor and a World-Wide-Web server;

Figure 4 details instruction layers operating on the master processor shown in Figure 3;

Figure 5 details instruction layers operating on the World-Wide-Web server shown in Figure 3;

Figure 6 details a first graphical page displayed on the terminal shown in Figure 2;

Figure 7 details a second graphical page displayed on the terminal shown in Figure 2, including a message play/view button icon;

Figure 8 details a dialogue between the terminal shown in Figure 2 and the world-wide-web server shown in figure 3, when activating the message play/view button icon;

Figure 9 details a third graphical page displayed on the terminal shown in Figure 2;

Figure 10A details steps performed when operating a voice telephone in order to control the intelligent network shown in Figure 2;

Figure 10B details additional steps performed when operating a voice telephone in order to control the intelligent network shown in Figure 2;

Figure 11A details processes operating in the intelligent network shown in Figure 3, in response to an incoming call; and

Figure 11B details additional processes operating in the intelligent network shown in Figure 3, in response to an incoming call.

Detailed Description of the Preferred Embodiment

A diagrammatic representation of a typical arrangement for service provision is shown in Figure 1. A service provider 101 has a large processing facility, on which incoming messages and data may be stored. In addition, the processing facility may also store data relating to the transfer of incoming telephone calls and facsimiles etc, in accordance with requirements established by customers. The service provider 101 has communication links with a public switched communication network 102, that is connected to telephones 103, 104 and 105, a fax machine 106 and a computer terminal 108 via appropriate interfacing equipment 107. The computer terminal 108 provides a sophisticated and user friendly interface for interrogating and setting up services by the service provider 101.

Referring to Figure 2, the service provider allows access to an intelligent network 201 that consists of a plurality of interconnected specialized telecommunications devices and a controlling computer. By providing processing capacity within the network, it becomes possible to effectively reconfigure the network by removing or adding hardware devices in accordance with the needs of customers and or as new services are created. The intelligent network is also connected to the Internet 202, that provides access to computer terminals 205 and 206 via modems or similar devices 203 and 204. The terminals 205 and 206 operate World-Wide Web browsing software, that communicates over the Internet using established procedures identified as the Hyper Text Transfer Protocol (HTTP).

The intelligent network 201, shown in Figure 2, is detailed in Figure 3. The intelligent network 201 comprises a master processor 301 and a number of semi-autonomous intelligent peripherals 303, 305, 306 and 307. The master processor is a Stratus Fault Tolerant Computer, connected to

the other peripherals via a ten megabit per second Ethernet local area network 302.

The public-switched telephone network 102 is connected to a telecommunications switch 305 via a standard G703 C7 link. The G703 C7 standard comprises several 2048000 (two megabit) per second serial channels, each carrying thirty speech channels, one signalling channel and one synchronization channel. The telecommunications switch 305 may accept up to 256 of such two megabit per second connections and in the preferred embodiment, four of such 2 megabit per second C7 channels 308 are connected to the network 102.

Other C7 channels 310 link the telecommunications switch 305 to the speech applications platform 306. The speech applications platform 306 is arranged to record and replay voice messages. The telecommunications switch 305 is also connected via C7 channels 311 to a fax box 307. This operates in a similar way to the speech applications platform 306 but is arranged to store facsimile image data rather than voice data. Facsimile data is stored in the standard Group 3 facsimile format and is and is simultaneously translated, as it arrives at the fax box 307, to Graphics Interchange Format (GIF), a well-established standard for communicating graphics data over the Internet 202.

A service subscriber operating terminal 205, has a personal profile stored on a database held on the master processor 301. The personal profile includes a telephone number and information that enables calls to that telephone number to be directed to user-defined alternative telephone numbers at particular times of the day. The subscriber's personal profile may specify telephone or fax numbers to which incoming calls are diverted. Alternatively, incoming calls may be directed to the speech applications platform 306 or the fax box 307.

Three types of data are stored on the intelligent network 201: the personal profile of a subscriber, voice messages (on the speech applications platform 306) and fax messages, on the fax box 307. The World Wide Web server 303 can communicate with the master processor

301 in order to arrange transmission of any of these three types of data over the Internet. Furthermore, the World Wide Web server 303 enables the user of the terminal 205 which is connected to the Internet 202, to affect the operations performed by the Intelligent network 201 in response to an incoming call, by modifying their respective personal profile.

Thus, voice and fax data is transferred from the public-switched telephone network 102 via the telecommunications switch between the speech applications platform 306 or the fax box 307, or alternatively redirected to a different telephone number on the public switched network 102. The actual routing of the data is controlled according to instructions operating on the master processor 301. The master processor 301 is able to instruct the other peripherals 303, 305, 306 and 307 in the intelligent network 201 to communicate with each other directly over the Ethernet local area network 302, thereby delegating data-intensive communications to the intelligent peripherals when appropriate.

When a call is initially received from the public-switched telephone network 102, signalling information is extracted by the telecommunications switch 305 from the C7 channel stream 308. The signalling data includes the source telephone number, such as telephone 103 and the destination telephone number. The master processor 301 may instruct switch 305 to check for a match with any of the telephone numbers which require redirecting.

Thus, after a very short period of time after the initial signalling information has arrived at the switch 305, said switch 305 can connect the channel to its appropriate destination. Voice data may be transferred over the C7 connection 310 to the speech applications platform 306 or the C7 connection 311 to the fax box 307. Alternatively, an external line 308 may be used in order to forward the call to an external telephone line. Thus the master processor 301 communicates with the intelligent peripherals in order to instruct them operate in an appropriate way.

Communication over the Ethernet local area network 302 is performed in accordance with the Protocol described in the applicants co-

pending European patent No 94 309 231, which enables the network to be configured and reconfigured substantially in real time. The World Wide Web server 303 consists of a SPARC Station 10 computer, connected to the Internet 202 via an ISDN connection 309.

The Stratus Fault Tolerant Computer, which operates as the master processor 301 in the intelligent network, operates according to instructions that are summarized in Figure 4. Communication with the ten megabit per second Ethernet local area network 302 is achieved using standard instructions according to the established TCP/IP communications protocol 401. This includes facilities for detecting collisions between simultaneously transmitted messages over the Ethernet and verifies that messages received from the Ethernet 302 have a valid pattern. Thus, TCP/IP 401 forms the basic foundation for communication between the master processor 301 and the other peripherals contained within the intelligent network 201.

The master processor 301 operates instructions 403 encoded in the operating system licensed under the trademark "UNIX". UNIX provides a reliable environment for complex local area networks. However when using TCP/IP 401 in environments of this type, delays may occur in communications between several intelligent peripherals over the same Ethernet connection 302. Thus, in addition to TCP/IP 401 and the UNIX operating system 403, an additional RDP layer 402 is provided in accordance with the aforesaid co-pending patent application. The combination of instruction layers 401, 402 and 403, as shown in Figure 4, permits real-time intelligent network processing to be performed.

The ten megabit per second Ethernet local area network 302 is used to supply information from the telecommunications switch 305, shown in Figure 3, to the master processor 301. Referring to Figure 4, instruction layers 401, 402 and 403 enable an extraction process to be performed on Ethernet signals, so that C7 signalling information may be stored in signalling stacks 405. This extraction process may be performed in accordance with operations performed by an additional instruction layer 404

which has the ability to interpret the Message Transport Protocol (MTP), used to define the manner in which C7 signals are encoded in the control environment. Additional protocols may be taken into account when storing signalling information in a signalling stack 405. Signalling information co-ordinated into signalling stacks 405 is suitable for presentation to specific applications, such as sets of instructions for performing tasks associated with a particular telecommunications service, such as diverting telephone calls, storing voice or fax messages etc. A Service Logic Execution Environment (SLEE) further organises real-time access to the data stored in the signalling stacks 405 and other information relevant to the operation of the master processor 301 within the service control environment. Applications 407, include instructions for the provision of a specific service, such as voice storage. Thus each application 407, includes instructions for communicating with other parts of the network using the SLEE 406.

The Sun Sparc Station 10 operating as the World Wide Web server 303, shown in Figure 3, includes instructions for communicating with the ten megabit per second Ethernet local area network 302, and instructions for communicating with the Internet 202 via an ISDN connection 309. Instructions for achieving this communication are summarized in Figure 5. Instruction layers 501, 502 and 503 operate similarly to instruction layers 401, 402 and 403, shown in Figure 4. Thus, these three layers facilitate real time intelligent network processing over the local area network using the UNIX operating system 503 on the World Wide Web server 303. Communication over the Internet 202 is performed in accordance with the Hyper Text Transfer Protocol (HTTP) 504. World Wide Web server instructions 505 communicate with the Internet 202 according to the Hyper Text Transfer Protocol defined in instruction layer 504. The telecommunications services that are to be made available to users operating over the Internet are defined using Common Gateway Instruction (CGI) scripts 506, 507, 508 and 509.

Each of the four CGI scripts 506 to 509 represents a function that may be requested at the terminal 205. Thus functions defined by the CGI

scripts 506 to 509 may be invoked remotely by a terminal, such as terminal 205, executing a World Wide Web browser. When a CGI script is invoked, this results in Hyper Text Markup Language (HTML) commands, according to the Hyper Text Transfer Protocol (HTTP), being sent to the terminal 205. Additional CGI scripts, are provided for various other operations. Specific descriptions of the effect of each of the four CGI scripts 506 to 509, shown in Figure 5, will now be given.

A customer operating the computer terminal 205, shown in Figure 2, operates software known as a World Wide Web browser. Any user equipped with an Internet address may use a general purpose World Wide Web browser, such as those sold under the Trade Marks "Netscape" and "Mosaic", to gain access to World Wide Web servers.

Upon making an initial contact with the World Wide Web server 303, shown in Figure 3, a CGI script 506 is activated, resulting in Hyper Text Markup Language (HTML) commands being sent across the Internet to the terminal 205. The World Wide Web browser operating on terminal 205 interprets the received HTML commands, generating a graphical display such as the one shown in Figure 6. A page generated by HTTP usually includes one or several hyper-text links, in the form of button icons or hyper text fields 602 to 613. Thus, it is not necessary for users to obtain software instructions directly from the network provider, in the form of magnetic disks etc, in order to gain access to control telecommunications services. Using the second network, in the form of the World-Wide web in the preferred embodiment, it is only necessary for the user to be equipped with a general purpose browser. This enables a channel to be established between the browsing customer and the network provider server, such that, in accordance with established protocols, instructions required for the customer to modify the telecommunications network are supplied from the server over the world-wide web for execution at the customer's terminal. Thus, in this way, it is not necessary for the network provider to supply and up-date specific sets of user instructions. Any user may gain access via the World-Wide web under which the server protocol supplies further

instructions required for the customer to gain access to the telecommunications network. Thus, each time these instructions are up-dated, in response to modifications, improvements, and the provision of new services, the new instruction environment becomes immediately available to the customers given that they will be supplied with the latest up-date as soon as a request is made via the World-Wide Web browser/server communications path.

A field may be activated via a mouse-operated pointer. Each field has a command associated with it, consisting of a string of characters, known as a Universal Resource Locator, URL. When a particular field is activated, its associated URL is sent, along with any text that may have been entered in the field, back to the World Wide Web server 303, from which the page of hyper text originated. The URL contains the name of a particular Common Gateway Interface (CGI) script, which is then invoked, possibly resulting in a new page of HTML being received at the terminal 205.

The page shown in Figure 6 has a title 601, indicating the trade name of a description of the service provided by the World Wide Web server 303. Typically this will be an eye-appealing colored graphical logo, in order to encourage users to take advantage of the services provided by the WWW server 303, and then charged to their subscriber account. Alternatively, the service may be perceived as a mechanism for encouraging additional use of the public switched network, with a resulting increase in revenue to the network provider.

In order to gain access to the services provided by the intelligent network 201, via the WWW server 303, it is necessary for a user operating terminal 205 to correctly supply an account number in account field 602 and a personal identification number (PIN) in a respective field 603, to ensure a level of security. Below the account number field 602 and the PIN field 603 are located several customer option fields 604 to 607. These allow the customer to select a particular operation, such as: view the status of the customer's profile 604, modify their diary 605, change the status of their

customer profile 606 and view or listen to their messages 607, depending upon whether the messages are fax or voice.

The status option field 606 enables customers to change the status of several personal numbers. For example, a customer may have a home number and an office number. Each of these numbers has a status associated with it, enabling calls to be screened or diverted or simply passed thru normally. The diary option 605 makes it possible for the customer to divert calls to various numbers depending on the time of day and day of week. Below the customer options 604 to 607 is a "Go-for-it" button field 610, which when activated by an appropriate mouse operation selects the operation chosen above.

Alternatively a "Clear" button field 611 may be used to clear the page and close the connection with the WWW server 303. Other options include the "About Secnet" button 612, which provides access to general information about the telecommunications services on offer, and the "Home page" button 613, which directs the WWW browser operating on terminal 205 to terminate the connection.

CGI script 507, shown in Figure 5 generates HTML in response to activation of option 607 in Figure 6, where the user of terminal 205 selects the option for looking for messages which have been left by callers. CGI script 507 generates HTML which is supplied through the ISDN connection 309, the Internet 202, the modem 203 to the terminal 205 resulting in a display of a graphical page shown in Figure 7.

The page displayed in response to execution of CGI script 507 includes a title field 701, voice messages 702 and 703 which have fields for the telephone number of the caller 704 and the time at which the call was made 705. Also displayed are fax messages 706 and 707, which include a field 708 for the calling number and a field 709 for the time at which the fax call was made. Furthermore, electronic mail messages, such as messages 710 and 713 are displayed, comprising a field 711 for identifying a calling address and a field 712 for identifying the time at which the message was received.

Figure 7 includes two examples of each type of message, however, the number of messages displayed on the screen depends on how many have been left by callers. Thus, it is possible that no voice messages will be displayed or, alternatively, several more of each type of message may be listed to the extent that not enough room is available on the visual display unit of terminal 205. In the latter case facilities for scrolling thru a number of messages will be provided thru the graphical user interface operating the WWW browser program.

Manipulation of a pointer on the screen shown in Figure 7, for example by using a mouse, enables voice messages 702, 703, fax messages 706, 707 or e-mail messages 710, 713 to be selected. Selected messages are highlighted by changing the displayed color of the selected message and once selected in this way it is possible to play back a voice message or, alternatively, to view a fax or e-mail message by activation of the play/view button 710. E-mail messages may also be played back as oral messages, using a text to voice interface and this option is selected by activating button 716. Alternatively, it may be decided that none of the messages are to be retrieved, in which case the clear button 715 may be activated, resulting in a return to the display of information shown in Figure 6.

Generation of the list of available voice, fax or e-mail messages shown in Figure 7 is performed by the CGI script 507. In order to generate this list of available messages, it is necessary for the WWW server 303, to communicate with both the speech applications platform 306 and the fax box 307. In many known computer networks, for example those operating in the format known as a file server network, the master processor 301 would typically co-ordinate all communications between the WWW server and other peripherals. However, in the intelligent network of the preferred embodiment, the master processor 301 delegates communications across the network between the various intelligent peripherals. Thus, it is possible for the master processor to instruct the WWW server 303 to perform all

operations necessary to conduct an on-line dialogue with a calling customer on the Internet 202.

Thus, while generating the form shown in Figure 7, execution of the CGI script 507 causes the WWW server 303 to interrogate the speech applications platform 306 in order to determine the number of calls which have been made to the subscriber's telephone numbers. This information is translated into HTML for transmission over the Internet to the customer's terminal 705. Field 704 is an active URL and is arranged to show the calling line identity of the caller who has left a voice message. By clicking on this URL, by activation of the appropriate mouse button, a "helper" application is activated at the client's side 705. This helper application, with the aid of Internet protocols, is configured to return the call by initiating the call in response to the stored line identity number.

The facsimile box 307 stores faxes in two formats consisting of the standard (Group III) facsimile format and Graphical Image Format (GIF). Standard facsimile format transmission is received during real-time fax transmissions and translation from Group III to GIF is performed during the reception of the facsimile, given the relatively slow speed of facsimile transmission. The data is then stored in these two formats allowing retransmission in Group III format to conventional facsimile machines or transmission to Internet terminals using the GIF format. Should a customer at terminal 205 decide to view a facsimile, the GIF-formatted documented will be transmitted over the ten megabit per second Ethernet local area network 302 to the WWW server 303. As the format is already in a form suitable for transmission to the WWW browser operating on the user's terminal 205, it is not necessary to perform any translation at this stage.

The CGI scripts use existing Internet protocols identified as POP3 and IMIP4, the latter providing support for multi-media e-mail, allowing for the transmission of audio signals, still pictures and video signals. This allows a system to be fully compatable with multi-media messaging. Thus, for example, a customer may receive voice and facsimile messages from fixed or mobile networks and then combine these in such a manner as to

generate electronic mail, with all the tools of electronic mail systems being available, such that the message may be posted to others on their own internal Intranet or to a wider audience of the Internet in a form more compatible with transmissions of this type.

In an alternative embodiment, making use of the widely available programming language "JAVA" fax and voice mail icons are displayed and configured to be dragged, in response to manual operation of a mouse, across a display screen to a mutli-media e-mail "workbench". Thereafter, by releasing the mouse, the icons may be dropped into an e-mail system ready for onward transmission, with any appropriate media conversion being performed automatically by the server.

An example will now be given of selecting message 702, shown in Figure 7, for play-back over loud speakers in terminal 205. Operations for playing back message 702 are summarized in the form of a dialogue between the server 303 and the browser instructions operating on the terminal 205. In process 801 the play button field 710 has been activated, resulting in the generation of a URL for that particular voice message. This URL contains within it an indication as to which of the displayed list of voice messages 702 and 703 has been requested. This URL is transmitted via the modem 203 thru the Internet 202 to the WWW server 303. In process 802 the World Wide Web server 303 receives the URL and examines its contents in order to determine which of the CGI scripts 506 to 509 should be invoked. The play-back of voice messages requires the invocation of CGI script 508 and this is then invoked.

In process 803 CGI script 508 communicates over the ten megabit per second Ethernet local area network 302 with the speech applications platform 306 in order to retrieve the voice message which has been stored on it. The voice message is then transferred over the Ethernet local area network 302 to the WWW server 303. The speech applications platform 306 stores voice messages in a proprietary format, that is not suitable for transmission to a WWW browser operating on a terminal 205. In process 804 the World Wide Web server 303 translates the proprietary voice

message storage format into a widely accepted format which has become known as the .AU format.

CGI script 508 then generates HTML for instructing the WWW browser operating on terminal 205 to play back the .AU file. In process 805 the .AU file is transmitted, embedded with suitable HTML, back over the Internet 202 to the terminal 205. In process 806, the WWW browsing instructions interpret the HTML, resulting in a stripping of the HTML code and a transmission of the .AU file to suitable digital signal processing circuitry, including a digital to analog converter and amplifier, so that the recorded message is replayed over loudspeakers in the terminal 205.

Referring briefly back to Figure 7, a facsimile message may be viewed in much the same way as a voice message is played back: For example, selection of fax message 706 by activating the play/view button field 710 generates a URL for that fax message which is then transferred back across the Internet to the World Wide Web server 303, where an appropriate CGI script, in this case CGI script 509, is invoked.

Communication similar to that described in Figure 8 with the speech applications platform 306, is performed with the fax box 307. Step 806 of Figure 8 is replaced by a step where, instead of playing back a .AU file over loud speakers, a GIF file is displayed on the monitor at terminal 205. The appearance of this display is shown in Figure 9. The fax display reproduces the summary of the fax 706, including fields 708 and 709, which indicate the caller source and the time at which the fax call was made. Two hypertext links appear on the fax page 901 and 902. The rotate button field 901 enables the fax to be rotated, in case the fax has been inserted in the transmitting facsimile upside down, which is a very common occurrence. When there is more than one page, hypertext button field 902 appears on the display, which enables the next fax page to be selected. The fax itself 903 appears graphically much as it would appear if reproduced on paper. Printing options available within WWW browsing environments, such as Netscape, provide facilities for printing out documents as they appear on

screen, so printing out the fax 903, shown in Figure 9, is accomplished using standard WWW browser operations.

Several other options appear in Figure 6; these are status 604, diary 605 and change status 606. Each of these has associated CGI scripts which are executed on the WWW server 303 in response to their selection on the customer's terminal 205. These additional options may be used to set-up the behaviour of certain aspects of the intelligent network, shown in Figure 3.

For example, a customer may have several telephone numbers at which the customer may be available at different times during the day and during the week. Thus, it is possible to define when a facsimile is stored or diverted. Similarly, calls may be stored or directed to different telephone numbers in accordance with information supplied by the customer operating the WWW browser on terminal 205.

The system as described enables incoming calls on the switched network 102 to be redirected or stored in accordance with the needs of a particular customer. The customer may view stored facsimiles or listen to stored messages on a remote terminal 205, connected to the Internet, or alternatively modify call-routing options for various times of the day or week.

Any computer terminal equipped with a suitable WWW browser, such as Netscape, may be used to access the Internet and thereby control call diversion and access calls which have been recorded by the intelligent network 201. All that is required is for the customer to type in the correct PIN 603 and account numbers 602 in order to verify their identity before gaining access to their personal messages. The Internet provides cheap access to the stored messages from anywhere in the world and facilitates a comprehensive user-friendly interface thru the use of the World Wide Web while not needing to be modified in step with changing telecommunications services.

A customer may be unable to access a suitable Internet terminal at some point in time and access to services may be provided using the

standard telephone. Preferably, additional means of communicating with the intelligent network over the public switched telephone network is provided, in order to supplement access provided by the computer terminal 205 connected to the Internet 202.

Variations to the system services provided by the intelligent network using a standard DTMF telephone are summarized in Figures 10A and 10B. In Figure 10A, in process 1001, an incoming call is received by the intelligent network. The intelligent network provides several services. In process 1002 a check is made to see if the digits 145 have been received. These digits signify the particular set of telecom services required. If the digits 145 have been received, control is directed to process 1004. In process 1004 an audio message is played over the telephone line to the calling customer, requesting the customer to type in their account number and PIN using the telephone's DTMF keypad.

The telephone keypad generates DTMF signals that are received and decoded by the intelligent network in order to determine which buttons have actually been pressed. In process 1005 a check is performed to see if a valid account number and PIN have been supplied by the calling customer. If they have not been entered correctly, the customer is prompted to try again. This may be repeated a number of times, after which the call may be terminated.

Once a valid account number and PIN have been received by the intelligent network, control is directed to process 1006. At this point the customer is played an audio message requesting selection of a particular service to be accessed. The service is indicated by pressing a single digit on the DTMF telephone keypad, which may have the value 1, 2, 3, 4 or 5. In process 1007 the intelligent network makes a decision as to which of these numbers has been pressed, and directs control to one of processes 1009, 1012, 1016, 1021 or 1027, shown in Figure 10B.

In process 1009, a screening option is provided. The customer is prompted by an audible message asking them to select whether or not they want screening to be performed on incoming calls. If the customer

responds by pressing key number 1, control is directed to process 1011 which sets up the intelligent network to allow all calls to be directed to a live telephone line. Alternatively, if control is directed to process 1010 in response to key number 2 being pressed, screening is switched on. When screening is switched on, incoming calls may be directed to the speech applications platform 306 or the fax box 307 for later replay at the discretion of the customer, using either a computer terminal 205 or a speech telephone.

In process 1012 the customer may make a choice from several options for manipulating the diary. In response to pressing key number 1, control would be directed to process 1013. In process 1013 the current contents of the diary may be transmitted as a facsimile to the calling customer. The number to which the facsimile would be directed is stored in the customer's personal profile. Thus, if the customer has two telephone lines, one of which is dedicated to facsimile transmissions and the other of which is the one being used for the current telephone call to the system, the intelligent network will phone the facsimile machine at process 1013 on the other line and transmit a facsimile of the current diary entries.

In response to pressing key number 2 at process 1012, control is directed to process 1014, where it becomes possible for the caller to select call diversions on an hourly basis. Similarly, in response to pressing keypad number 3 at process 1012, control is directed to process 1015, where calls may be diverted on a daily basis.

In process 1016 the messaging function has been selected. At this point the caller may select digits 1, 2, 3 or 4. In response to pressing keypad number 1, control is directed to process 1017, where it is possible to hear any of the messages which have been recorded on the speech applications platform 206. In response to pressing key number 2 at process 1016, control is directed to process 1019, where it is possible to select a different message for replay. In response to pressing key 3 at process 1016, control is directed to process 1018, where it is possible to delete a message. In response to pressing key 4 at process 1016, control is directed

to process 1020, where it is possible to select whether facsimile transmissions are stored on the fax box 302, or diverted to a reproduction machine having a number stored in the customer's personal profile.

At process 1021 the customer is given four possible options, selectable by pressing keys 1 to 4 respectively. In response to pressing keypad 1, control is directed to process 1023, which instructs the intelligent network to direct incoming calls to the home telephone number. In response to pressing key 2 at process 1021, control is directed to process 1024, where the intelligent network is instructed to direct calls in response to the call diversion indications which have been stored in the diary. In response to pressing key 3 at process 1021, control is directed to process 1025, which instructs the intelligent network to direct calls to the office. Similarly, in response to pressing key 4 at process 1021, control is directed to process 1026, which establishes that incoming calls should be directed to the mobile telephone number 1026, stored in the customer's personal profile. The final option shown in Figure 10B is process 1027, which enables the customer to terminate the call. Once any of the processes detailed in Figure 10B have been completed, control is directed back to process 1006 of Figure 10A, thus making it possible to select a different service or, alternatively, to end the call.

Methods for setting up and interrogating call forwarding and call storage have now been described. Operations performed by the intelligent network 201 in response to a normal call being made to a number owned by a service subscriber, are shown in Figures 11A and 11B.

In Figure 11A, an incoming call is made to the subscriber's telephone number in process 1101. In process 1102 a decision is made by the intelligent network as to whether the incoming call is a facsimile or a voice call. This decision is made according to which number the incoming call has been made to. If the incoming call is a fax call, control is directed to process 1120 in Figure 11B. Alternatively, if the incoming call is a voice call, control is directed to process 1103.

At process 1103 the customer's profile is interrogated to select the destination for the call. This may be one of three basic types of destination. The first destination type is the speech applications platform 306. If the personal profile indicates that incoming voice calls should be directed to the speech applications platform 306, to be stored as messages in the style of a telephone answering service, control is directed to process 1104.

In process 1104 the caller is prompted to leave a message and if a message is provided, this is stored in the speech applications platform 306. Alternatively, the destination indicated by the customer's personal profile at process 1103 may be further defined by accessing the diary. In this case control is directed to process 1105, where the master processor 301 interrogates the diary in order to find out which number the incoming call should be connected to. Once the call has been forwarded to this number, the call may proceed as a normal call and control is directed to process 1107.

The final type of destination selectable at process 1103 is sub-divided into three possible destinations, whose numbers are recorded in the subscriber's personal profile. Thus, in process 1106 the call is redirected to the office, mobile or home number of the subscriber, in accordance with the preferences expressed when setting up the personal profile. Thereafter, the call continues as a normal call. After process 1107 control is directed to process 1108, where the call is cleared and ended.

Operations performed by the intelligent network in response to receiving a fax call are detailed in Figure 11B. In process 1120 the destination of the fax call is selected. This may be one of two different destinations, being the fax box or, alternatively, a forwarding telephone number for a different facsimile machine. If the destination indicated by the subscriber's personal profile is the fax box, control is directed to process 1121, where the incoming fax is stored in the fax box 307. As the incoming fax is stored in group III format, the fax box 307 simultaneously translates this into the GIF format.

After the fax has been stored in the fax box 307, control is directed to process 1124, where the call is cleared. Alternatively, the destination may be an operational facsimile machine, whose number has been stored in the subscriber's personal profile. In this case, control is directed to process 1122, where the forwarding number for the fax machine is retrieved from the subscriber's personal profile and a call is made to that number. Thereafter, in process 1123, the fax call continues as normal and is terminated in process 1124.

Claims

1. Apparatus for communicating with a configuring device for configuring a telecommunications network, comprising:

a second network including input means and output means; and

a user terminal connected to said configuring device via said second network; wherein

said output means is arranged to generate instructions for presenting a user interface; and

said input means is arranged to receive configuration data from said terminal and to supply configuration commands to said configuring device.

2. Apparatus according to claim 1, wherein said telecommunications network is a switched telephone network arranged to receive voice signals and modulated data signals.

3. Apparatus according to claim 2, including means for forwarding incoming calls to selected destinations.

4. Apparatus according to claim 2, including means for storing incoming voice calls.

5. Apparatus according to claim 2, wherein said modulated data signals are facsimile transmissions.

6. Apparatus according to claim 5, including means for storing said facsimile transmissions.

7. Apparatus according to claim 1, wherein said second network is the Internet and output instructions and input data are supplied over said Internet in accordance with the hypertext transport protocol.

8. A method of providing user access to configuring apparatus arranged to control aspects of a telecommunications network, such that users may configure aspects of said telecommunications network independently of a network provider, comprising steps of:

providing a second communications channel between a user and said control apparatus via a second network, said second network having a user terminal and an interconnection means for connecting said second network to said control means,

wherein a user interface is presented to a user at said user terminal in response to user interface commands supplied to said user terminal from said interconnection means via said second network, such that said interface commands invite a user to modify said telecommunications network and

in response to modification instructions generated at said user terminal, control instructions are sent to said control means via said second network and said interconnection means.

9. A method according to claim 8, wherein communications received by said telecommunications network are stored by said first network and said communications are relayed to said user via said second network.

10. A method according to claim 8, wherein said second network is the Internet and instructions are supplied over said Internet in accordance with the hypertext transport protocol.

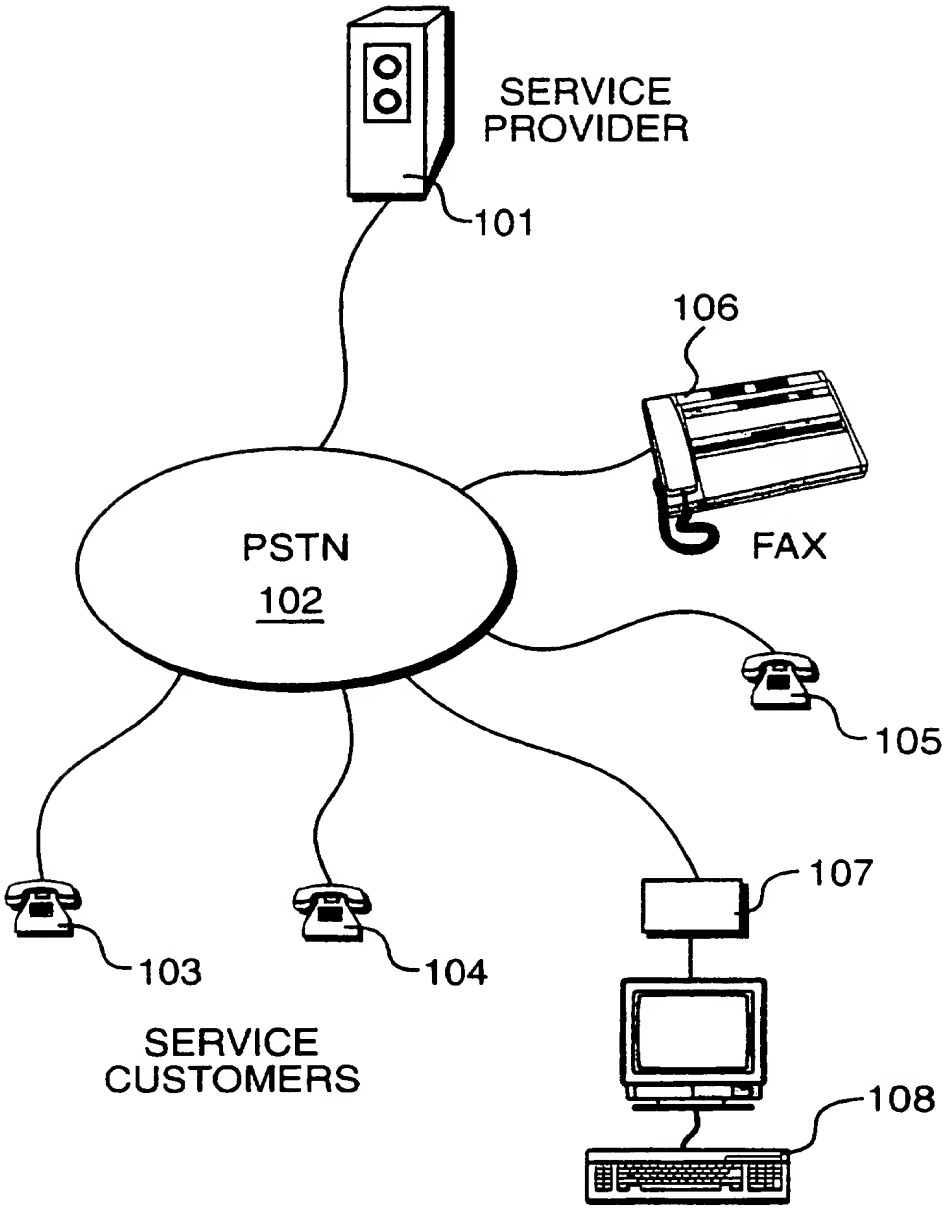

Figure 1

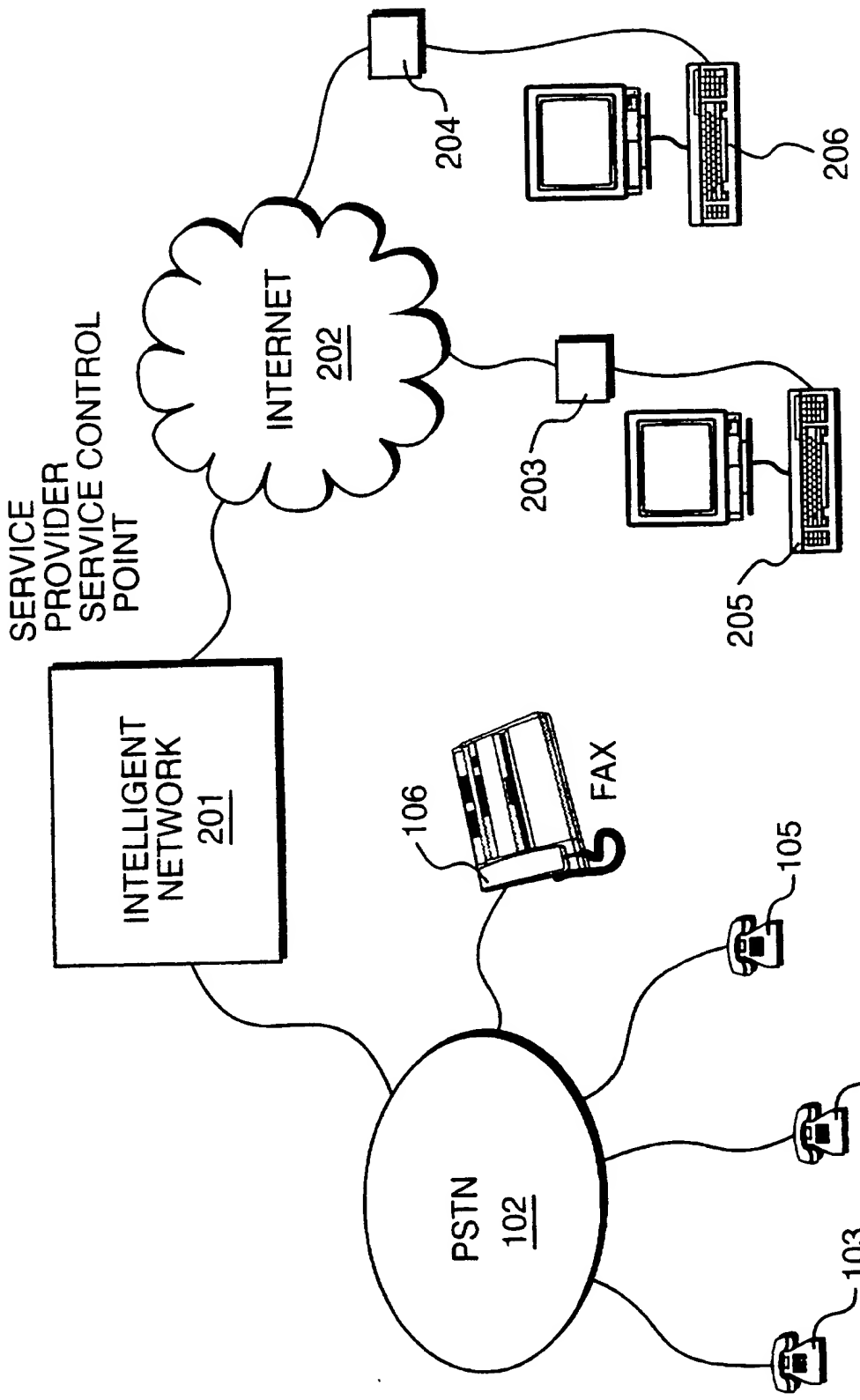
SERVICE PROVIDER SERVICE CONTROL POINT
INTELLIGENT NETWORK 201
INTERNET 202
PSTN 102
FAX
103
104
105
106
203
204
205
206

Figure 2

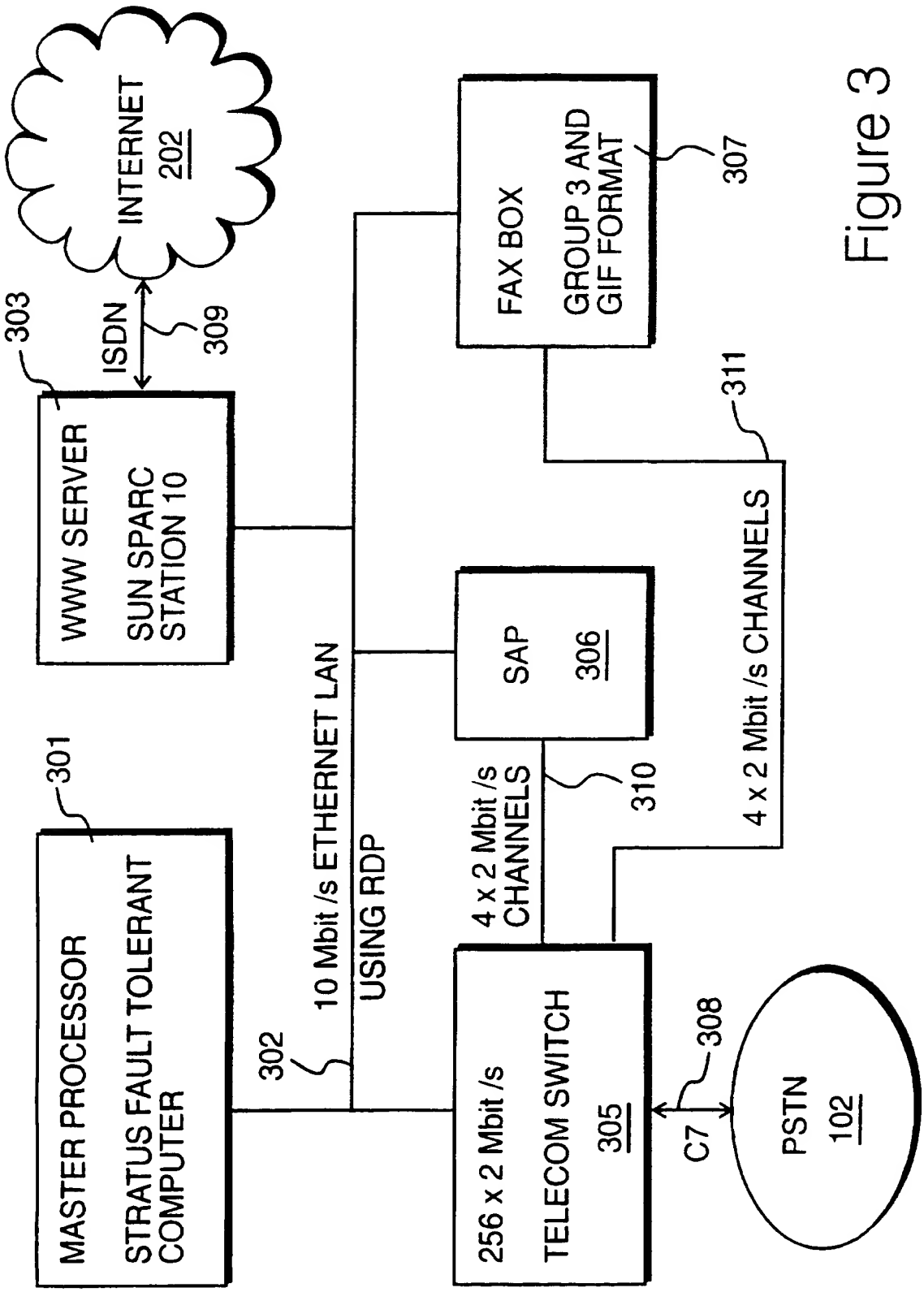
INTERNET
202
303
ISDN
309
WWW SERVER
SUN SPARC
STATION 10
FAX BOX
GROUP 3 AND
GIF FORMAT
307
311
SAP
306
301
MASTER PROCESSOR
STRATUS FAULT TOLERANT
COMPUTER
302
10 Mbit /s ETHERNET LAN
USING RDP
4 x 2 Mbit /s
CHANNELS
310
4 x 2 Mbit /s CHANNELS
256 x 2 Mbit /s
TELECOM SWITCH
305
C7
308
PSTN
102

Figure 3

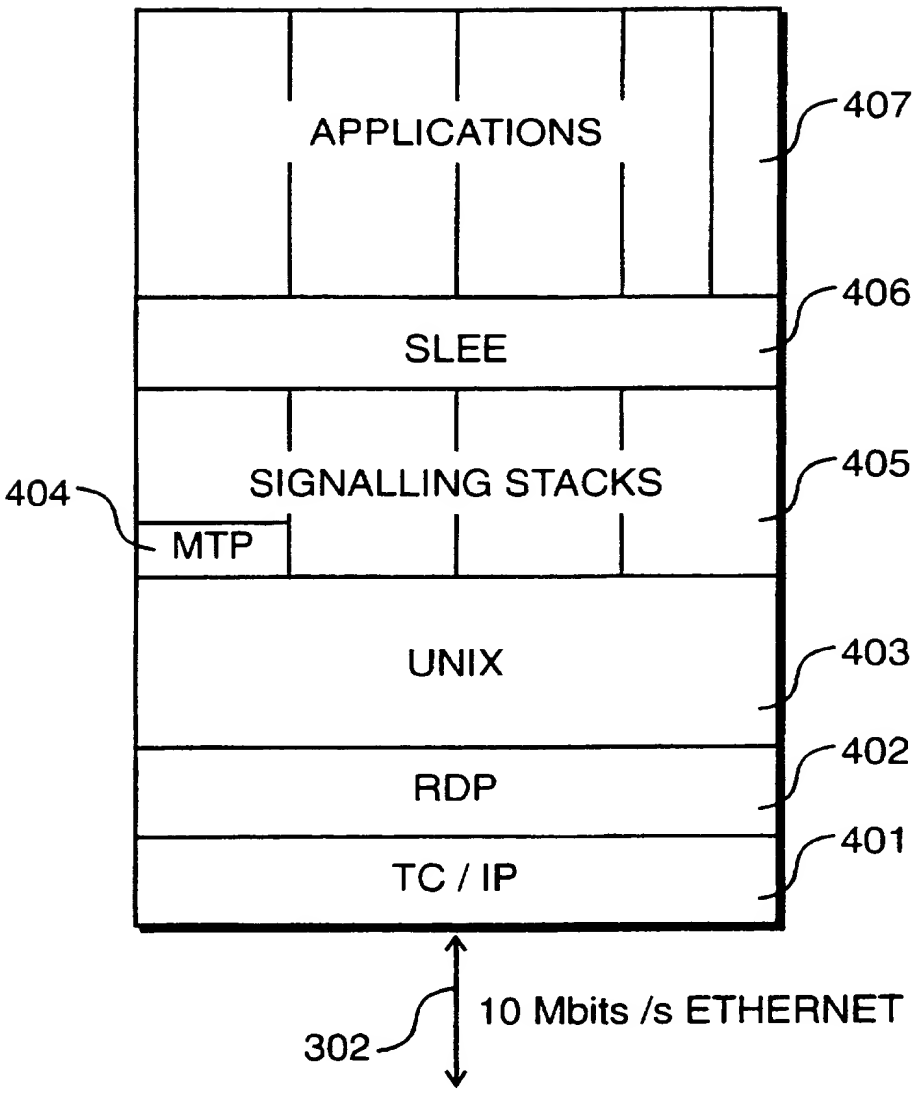
APPLICATIONS
407
SLEE
406
SIGNALLING STACKS
405
404
MTP
UNIX
403
RDP
402
TC / IP
401
10 Mbits /s ETHERNET
302

Figure 4

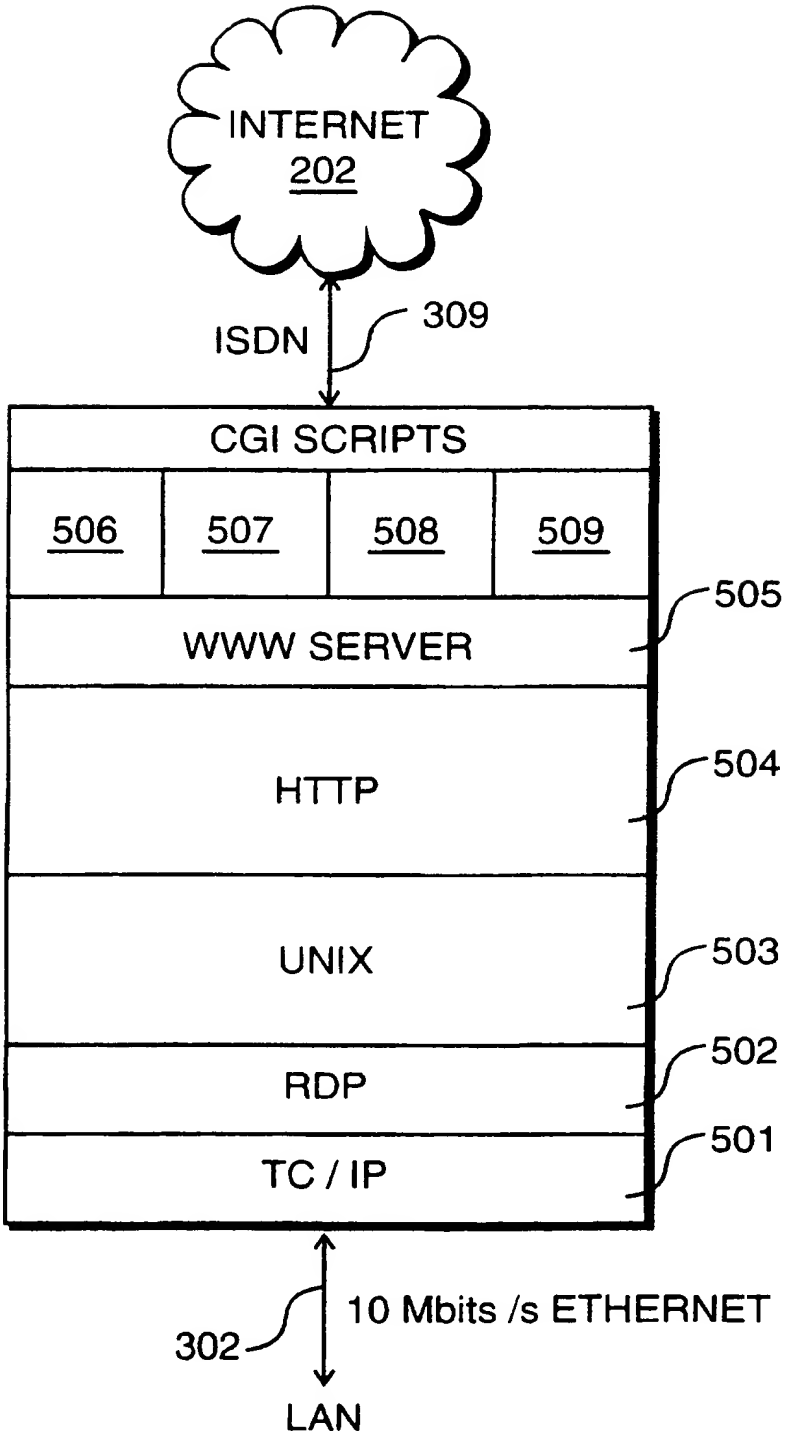
INTERNET
202
ISDN
309
CGI SCRIPTS
506
507
508
509
505
WWW SERVER
504
HTTP
503
UNIX
502
RDP
501
TC / IP
10 Mbits /s ETHERNET
302
LAN

Figure 5

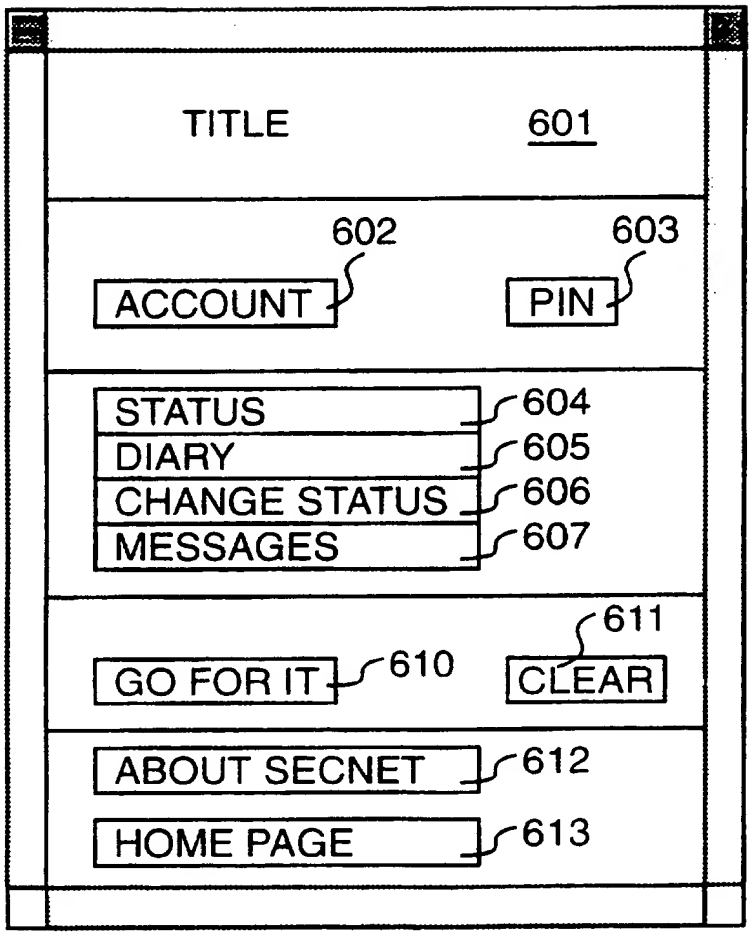
TITLE
601
602
603
ACCOUNT
PIN
STATUS
604
DIARY
605
CHANGE STATUS
606
MESSAGES
607
611
GO FOR IT
610
CLEAR
ABOUT SECNET
612
HOME PAGE
613

Figure 6

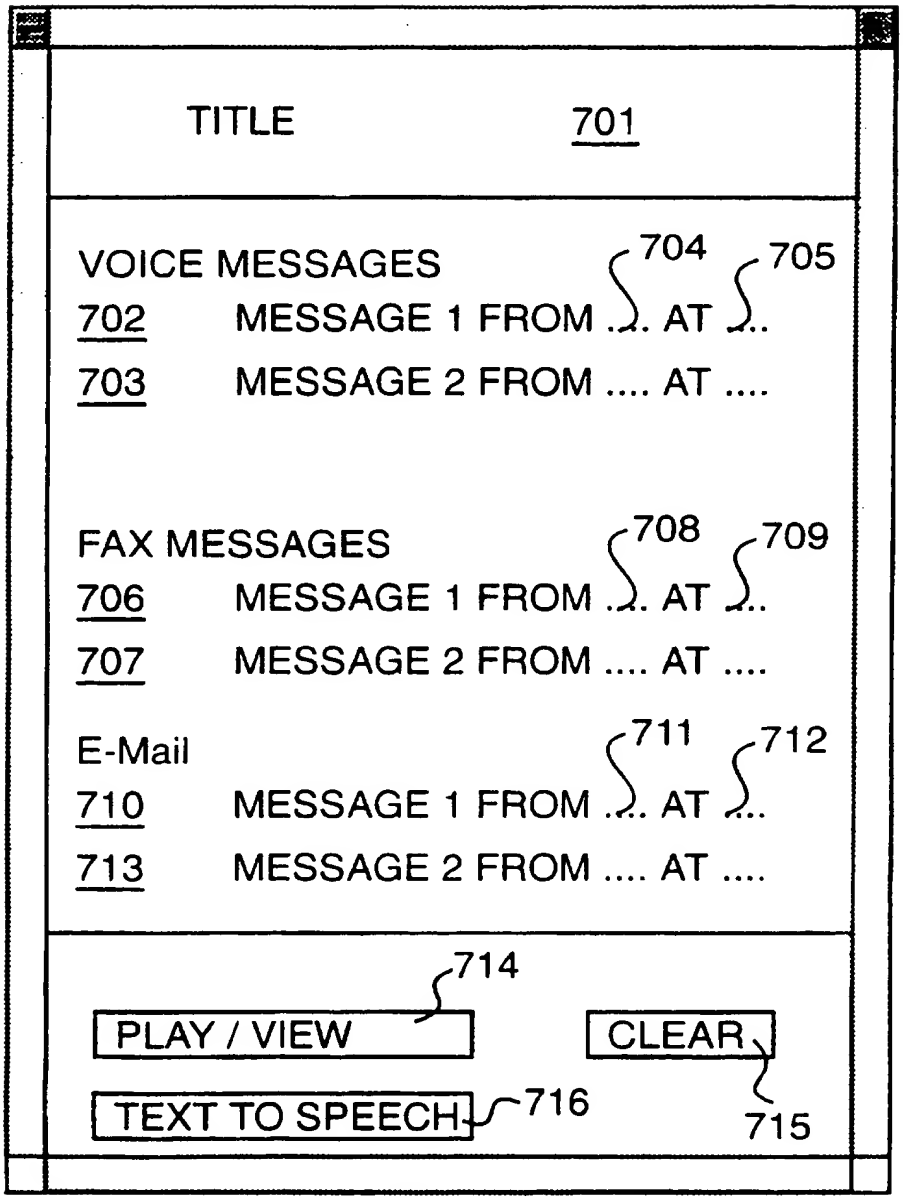
TITLE
701
VOICE MESSAGES
704
705
702 MESSAGE 1 FROM ... AT ...
703 MESSAGE 2 FROM .... AT ....
FAX MESSAGES
708
709
706 MESSAGE 1 FROM ... AT ...
707 MESSAGE 2 FROM .... AT ....
E-Mail
711
712
710 MESSAGE 1 FROM ... AT ...
713 MESSAGE 2 FROM .... AT ....
714
PLAY / VIEW
CLEAR
TEXT TO SPEECH
716
715

Figure 7

	SERVER 303	BROWSER 205
801		GENERATE URL FOR VOICE MESSAGE 702
802	RECEIVE URL AND INVOKE RESPECTIVE CGI SCRIPT	
803	RETRIEVE VOICE MESSAGE FROM SAP 306	
804	CONVERT VOICE MESSAGE TO .AU FORMAT	
805	TRANSMIT .AU FILE EMBEDDED WITHIN HTML	
806		PLAY BACK .AU FILE OVER LOUDSPEAKERS

Figure 8

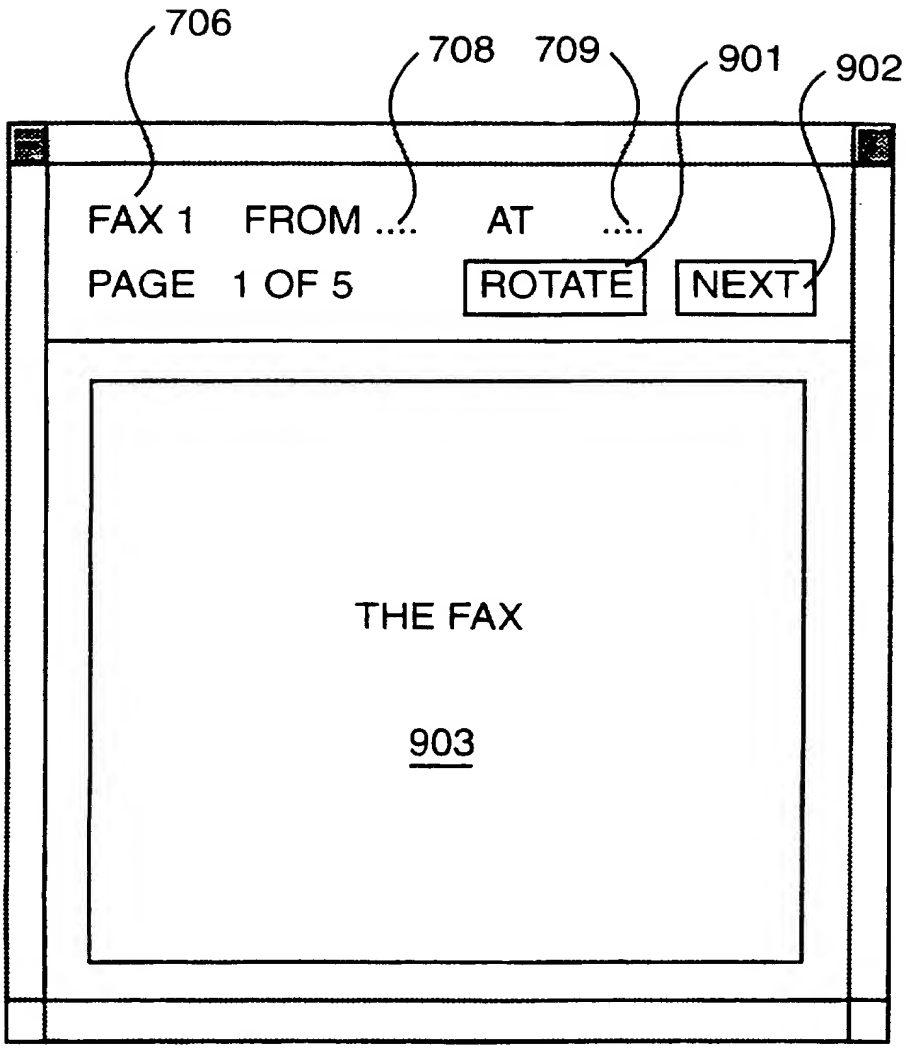
706
708
709
901
902
FAX 1 FROM .... AT ....
PAGE 1 OF 5
ROTATE
NEXT
THE FAX
903

Figure 9

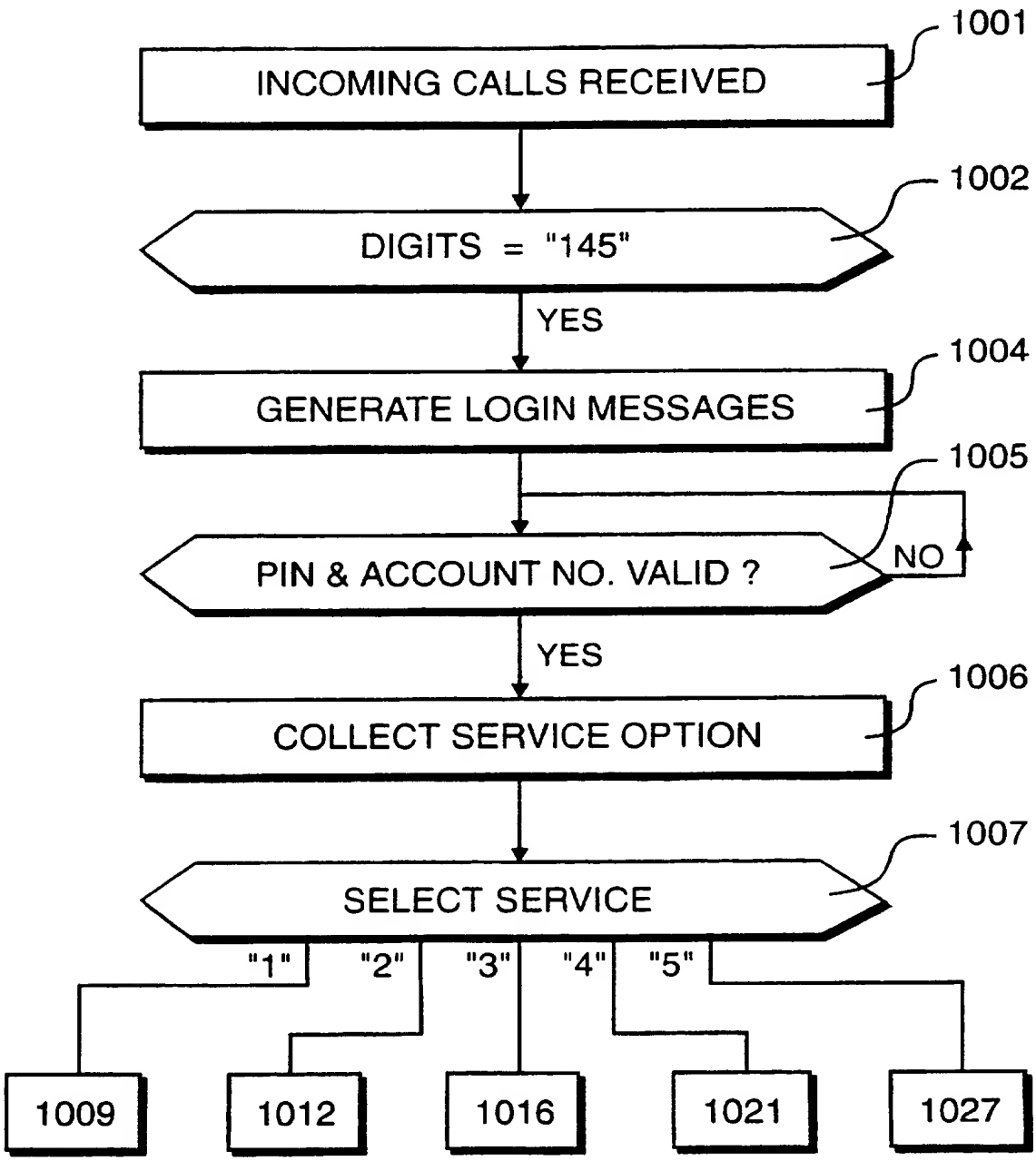
1001
INCOMING CALLS RECEIVED
1002
DIGITS = "145"
YES
1004
GENERATE LOGIN MESSAGES
1005
PIN & ACCOUNT NO. VALID ?
NO
YES
1006
COLLECT SERVICE OPTION
1007
SELECT SERVICE
"1"
"2"
"3"
"4"
"5"
1009
1012
1016
1021
1027

Figure 10A

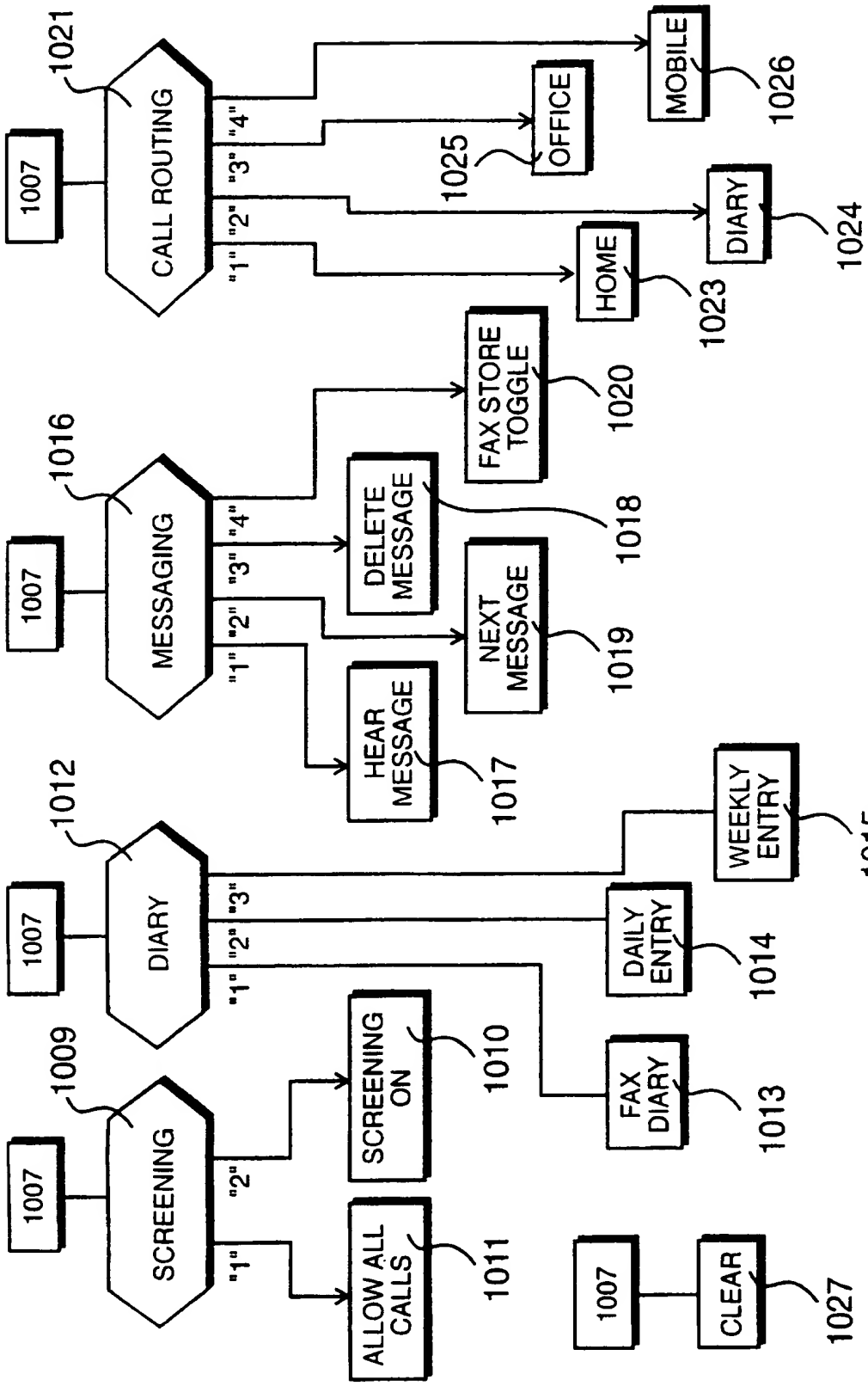
1021
CALL ROUTING
1007
"1"
"2"
"3"
"4"
HOME
1023
DIARY
1024
OFFICE
1025
MOBILE
1026
1016
MESSAGING
1007
"1"
"2"
"3"
"4"
HEAR MESSAGE
1017
NEXT MESSAGE
1019
DELETE MESSAGE
1018
FAX STORE TOGGLE
1020
1012
DIARY
1007
"1"
"2"
"3"
FAX DIARY
1013
DAILY ENTRY
1014
WEEKLY ENTRY
1015
1009
SCREENING
1007
"1"
"2"
ALLOW ALL CALLS
1011
SCREENING ON
1010
1007
CLEAR
1027

Figure 10B

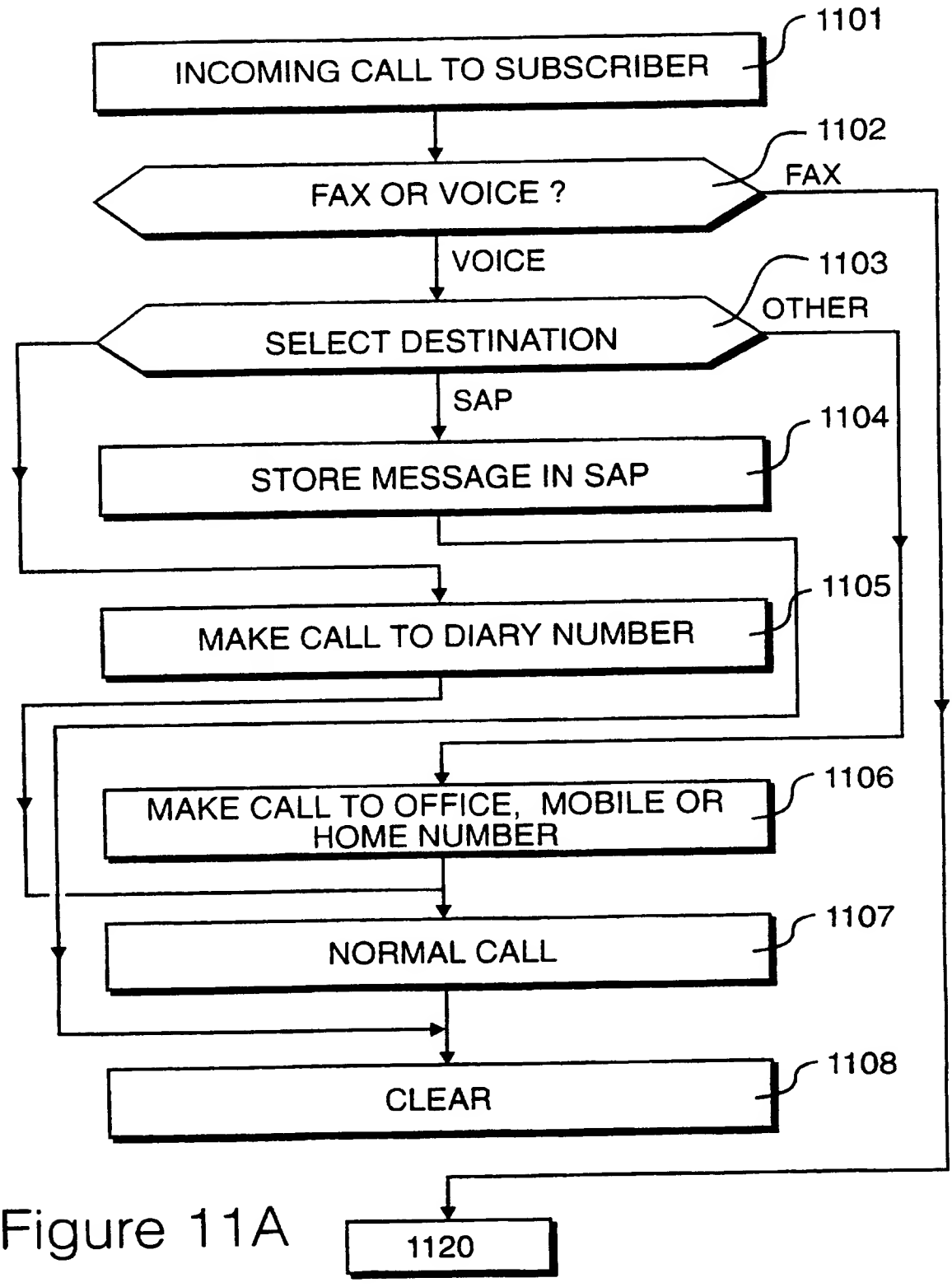
1101
INCOMING CALL TO SUBSCRIBER
1102
FAX OR VOICE ?
FAX
VOICE
1103
OTHER
SELECT DESTINATION
SAP
1104
STORE MESSAGE IN SAP
1105
MAKE CALL TO DIARY NUMBER
1106
MAKE CALL TO OFFICE, MOBILE OR HOME NUMBER
1107
NORMAL CALL
1108
CLEAR
1120

Figure 11A

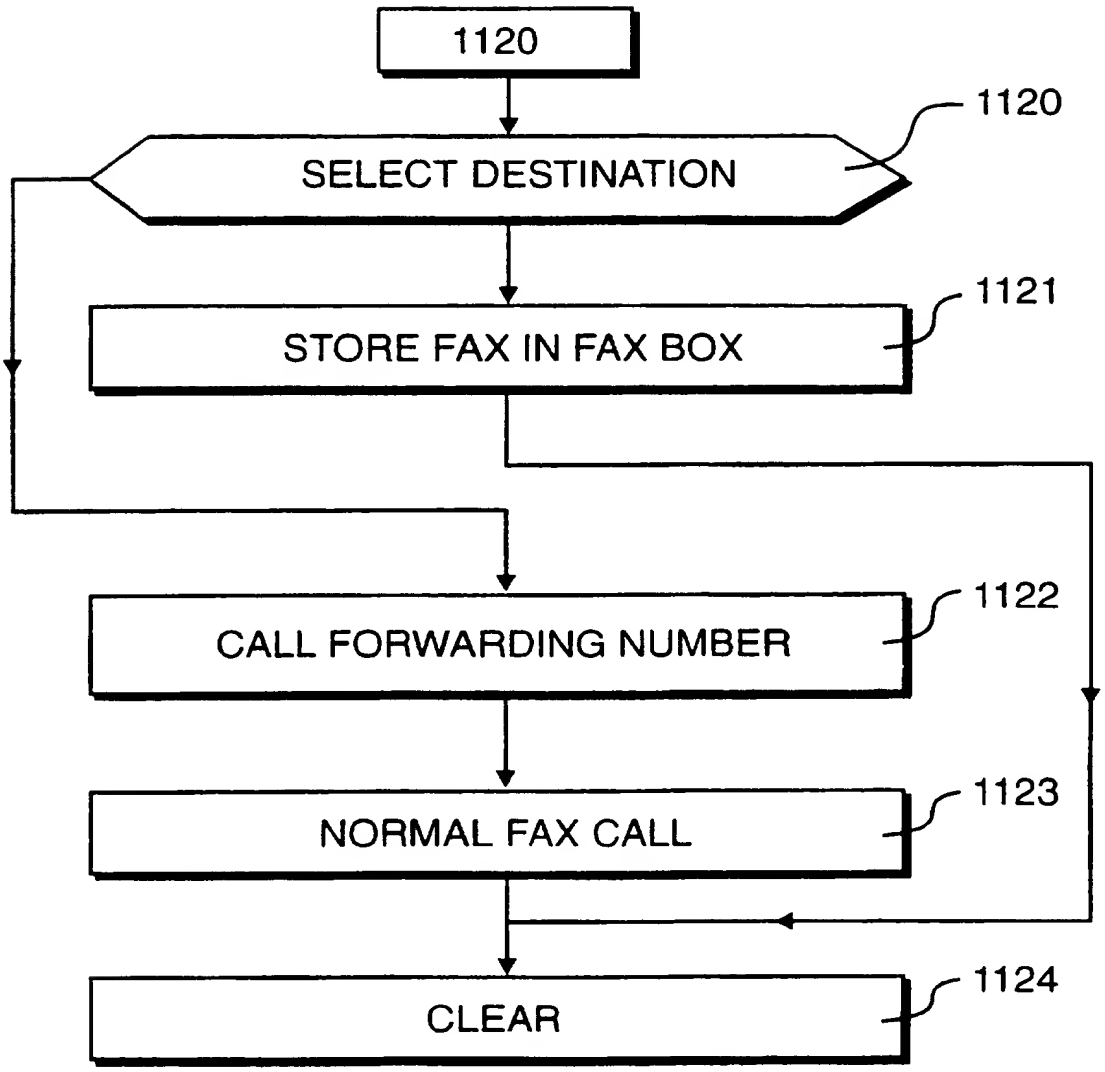
1120
1120
SELECT DESTINATION
1121
STORE FAX IN FAX BOX
1122
CALL FORWARDING NUMBER
1123
NORMAL FAX CALL
1124
CLEAR

Figure 11B

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/03135

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M3/42 H04M3/50 H04Q3/00 H04M3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 23523 A (NOKIA TELECOM.) 13 October 1994 see page 4, line 17 - line 27 ---	1,2,8
X	IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE & EXHIBITION, vol. 2, 28 November 1988 - 1 December 1988, HOLLYWOOD(US), pages 1039-1043, XP000013921 RENEE M. GOLDAPER: "OPERATIONS TECHNOLOGY IMPACTS OF POTENTIAL NEW NETWORK CAPABILITIES" see page 1040, left-hand column, line 1 - right-hand column, line 54 --- -/--	1-4,8,9

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

2

Date of the actual completion of the international search	Date of mailing of the international search report
23 April 1997	07.05.1997

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Vandevenne, M

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	IEEE COMMUNICATIONS MAGAZINE, vol. 31, no. 3, March 1993, US, pages 38-47, XP000359202 EMILIO CANCER: "IN ROLLOUT IN EUROPE" see figure 1	1,8
A	INTERNATIONAL CONFERENCE ON COMMUNICATIONS, vol. 2, 23 - 26 June 1991, DENVER(US), pages 936-940, XP000269623 DUANE M. FIGURSKI ET AL: "USER-CENTERED PROGRAMMABILITY OF INTELLIGENT NETWORK FEATURES" see page 937, left-hand column, line 12 - page 938, left-hand column, line 5	1-3,8
A	BT TECHNOLOGY JOURNAL, vol. 13, no. 2, April 1995, IPSWICH (GB), pages 64-72, XP000500757 S.KABAY ET AL: "THE SERVICE NODE- AN ADVANCED IN SERVICES ELEMENT"	
A	INFORMATIONWEEK, no. 538, 31 July 1995, US, page 95 XP000560768 STEPHANIE STAHL: "NEW SERVICE CROSSES ALL LINES"	
A	COMPUTER RESELLER NEWS, 28 November 1994, US, page 12 XP000560769 CHARLOTTE DUNLAP: "AT&T : INTERNET CAN TALK, TOO"	
A	US 5 127 003 A (DOLL) 30 June 1992	

INTERNATIONAL SEARCH REPORT

.nformation on patent family members

Inte ·onal Application No
PCT/GB 96/03135

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		AU 675708 B	13-02-97
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		CN 1120878 A	17-04-96
		EP 0694239 A	31-01-96
		JP 8508375 T	03-09-96
US 5127003 A	30-06-92	EP 0524297 A	27-01-93
		WO 9214314 A	20-08-92
		US 5351276 A	27-09-94